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WestFAST Agencies

Water Availability Studies Inventory

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Introduction

At the fall 2010 Western States Water Council (WSWC) meeting, the Executive Committee asked WestFAST to compile an inventory of federal research efforts related to water availability. The purpose of this inventory is to identify possible areas of collaboration between the federal agencies, as well as identify collaboration opportunities for states.

This report was compiled in November-December 2010 via the representatives of the WestFAST member agencies. Although it is intended to be as full of an inventory as possible, this report is by no means an exhaustive list. For example, there are numerous site-specific studies that are not included in this list. This report is meant to focus on the larger efforts, or provide site-specific efforts that are indicative of larger scale programs. This report also does not include the various specific modeling efforts that are underway by the various federal agencies.

The bulk of these federal efforts are being implemented by the Department of the Interior as part of their implementation of the Secure Water Act, and the WaterSMART initiative. There are also several other efforts that were underway prior to the WaterSMART initiative. These efforts vary from focused studies on water availability, endangered species protection, drought predictions, and groundwater. WestFAST could play a key role in coordinating these efforts, and the WaterSMART initiative could provide an excellent venue for such coordination.

In addition to a discussion on water availability studies, this report includes a section on national water quality studies that are underway. Although the main focus of this document is water quantity, we felt that it was important to also consider the relationship between quantity and quality and so have included two examples of national water quality studies.

WaterSMART Initiative

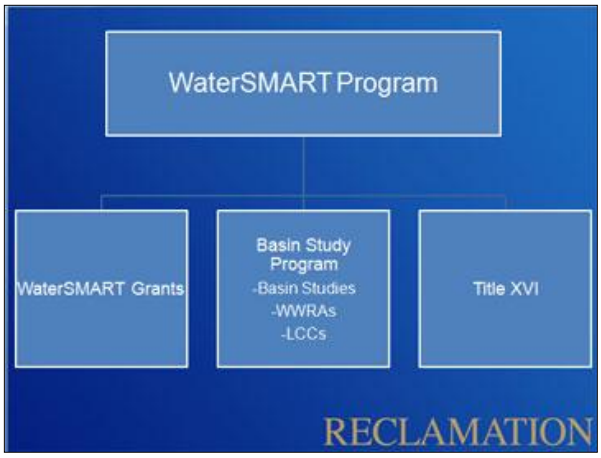
The Department of the Interior Secretary Salazar in February 2010 established the WaterSMART (the SMART stands for 'Sustain and Manage America's Resources for Tomorrow') via a Secretarial Order No. 3297. The purpose of the initiative, in the words of the order is to:

> '…secure and stretch water supplies for use by existing and future generations to benefit people, the economy, and the environment, and identify adaptive measures needed to address climate change and future demands. Through this Order, the Department of the Interior (DOI) will pursue a sustainable water supply for the Nation by establishing a framework to provide federal leadership and assistance on the efficient use of water, integrating water and energy policies to support the sustainable use of all natural resources, and coordinating the water conservation activities of the various Interior bureaus and offices. DOI's efforts will contribute to the development of domestic expertise in water-related technologies and sustainable water management practices, thereby enhancing U.S. competitiveness in providing solutions to worldwide water issues in the 21st century.'

The WaterSMART initiative is a collaborative DOI effort with the DOI agencies playing key roles. The agencies are developing science to support decision makers on the potential impacts of climate change, developing strategies for mitigating those impacts, and promoting basinwide, holistic approaches to resource management. The efforts of these agencies are coordinated at the Deputy Secretary level, who also helps coordinate with other federal agencies.

Following is a list of projects under the WaterSMART initiative that relate to water resources in the Western States:

a. **Basin Studies** (Federal/State partnership led by the Bureau of Reclamation (Reclamation)): The Basin Study Program includes three activities: (1) Basin Studies; (2) West-Wide Climate Risk Assessments; and, (3) Reclamation's participation in Landscape Conservation Cooperatives (LCCs). These three activities represent a comprehensive approach to incorporate the best available science to identify the impacts of climate change to water resources and to identify strategies to adapt to climate change.



In conducting the Basin Studies, Reclamation works with States, tribes, and local partners to analyze the impacts of climate change on water and power facilities in basins and sub-basins in the Western States to develop mitigation and adaptation strategies. Beginning in 2012, contingent upon appropriations, Reclamation, as authorized under Section

9503 of the Secure Water Act, will begin funding feasibility studies to implement adaptation strategies identified in a Basin Study or equivalent study.

Studies that are currently underway include:

- Colorado River Basin Study
- Yakima River Basin Study
- St. Mary and Milk River Basins Study
- Truckee River Basin Study
- Deschutes River Basin Study
- Henrys Fork of the Snake River Basin Study
- Niobrara River Basin Study
- Santa Ana Watershed Basin Study
- Southeast California Regional Basin Study

Plans of Study currently underway:

- Klamath Basin Study
- Taos Pueblo Water Supply and Demand Basin Study

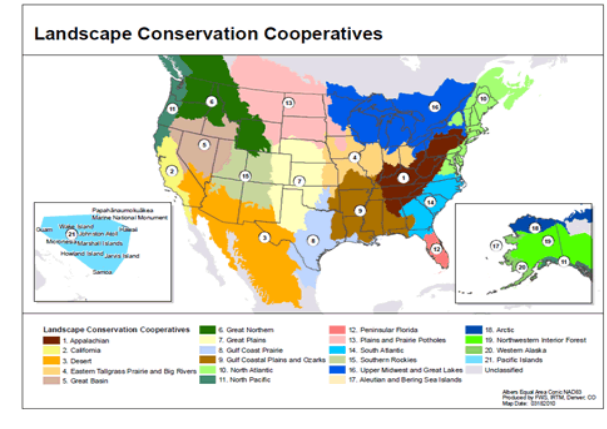
For more information see: http://www.usbr.gov/WaterSMART/basin.html

b. **West-Wide Climate Risk Assessments (**complementary activity with the Basin Studies and the Landscape Conservation Cooperatives within the Reclamation's Basin Study Program): Through the West-Wide Climate Risk Assessments, Reclamation is conducting baseline climate impact analyses; assessing impacts to water supplies; and evaluating impacts to Reclamation's mission activities, including water delivery, power generation, endangered species, ecosystem resiliency, and water quality consistently across the Western United States. These assessments establish a foundation for more in-depth analyses and continued development of adaptation options through Basin Studies, and contribute to, and are informed by, local level adaptation by the partners within the LCC network.

For more information see: http://www.usbr.gov/WaterSMART/wwcra.html

c. **Landscape Conservation Cooperatives (LCCs)** (partners include Federal, state, local, tribal governments, and non-governmental organizations (NGOs)): In response to increasing challenges to natural and cultural resource management, Reclamation and the Fish and Wildlife Service are co-leading the establishment of two LCCs-- the Southern Rockies and the Desert LCCs.

The LCCs are partnerships of governmental (federal, state, tribal and local) and NGOs. The primary goal of the LCCs is to bring together science and resource conservation



to inform climate adaptation strategies to address climate change and other stressors within an ecological region, or "landscape." Each LCC will function in a specific geographic area, and will form a national and ultimately an international network. To learn more about LCCs go to: http://www.fws.gov/science/SHC/lcc.html or http://www.usbr.gov/WaterSMART/lcc.html

d. **Water Census** U.S. Geological Survey (USGS): Under this initiative, USGS is leading the Colorado River Basin Geographic Focus Study. This study is one of three studies (the other two being in the East) that will focus on basins where there is significant competition over water resources. The USGS is coordinating with the Reclamation and other stakeholders on identifying ways to:

(1) Improve data on evapotranspiration;
(2) Better understand the role of groundwater as a resource in the basin;
(3) Define groundwater-surface water interactions for river flows;
(4) Evaluate flow variability and its influence on aquatic communities;
(5) Investigate the role that salinity plays in limiting water availability;
(6) Improve water use data in the Upper Colorado Basin.

The efforts of this study will be coordinated with all of the other efforts of the WaterSMART initiative.

e. **Climate Science Centers** (USGS): In accordance with Secretarial Order No. 3289, DOI is expanding the scope and geographic reach of its climate science efforts by establishing eight regional Climate Science Centers. Five of these centers will be located in the West. These centers will provide scientific information, tools, and techniques that land, water, wildlife and cultural resource managers and other interested parties can apply to anticipate, monitor and adapt to climate and ecologically-driven responses at regional-to-local scales. They will work in close collaboration with the LCC's, and provide the necessary science and data for the LCC efforts. More information can be found at http://nccwsc.usgs.gov/csc.shtml.

f. **Cooperative Water Program** (USGS): The USGS CWP is a diverse program that supports a wide range of water resources data collection activities and hydrologic investigations that are jointly funded by over 1600 State, local and tribal water resources agencies nationwide. Much of the hydrologic data collected through the CWP at approximately 4,600 streamgages, 10,500 ground-water observation wells, and 4,500 water-quality monitoring sites is used to support analyses of water availability and use. In addition, USGS works with cooperating agencies to assess the availability and sustainability of water in a wide range of the nation's aquifer and stream systems. Recent water availability investigations in the Western States include assessments of the Yakima basin in Washington State, the Rio Grande basin in New Mexico, the San Pedro basin in Arizona, the high-plains aquifer in Nebraska, and numerous aquifer storage and recovery projects in California. Work is ongoing in numerous other locations in the Western States, and this information will be used to support regional and national water-availability assessments carried out by USGS under the Water Census noted above. More information on the USGS CWP can be found at http://water.usgs.gov/coop/.

Other Western Water Availability Efforts

With water being such a valuable resource, and with the limited availability of water in the Western States, there have historically been several federal efforts focused on evaluating the availability and usage of water. The below list provides an inventory of a number of those efforts. Many of these efforts, although led by the federal agencies, are implemented in collaboration with the state or local authorities.

1. **NIDIS Upper Colorado River Basin Pilot** National Oceanic and Atmospheric Administration (NOAA) (USGS): The purpose of this project is to develop a drought early warning information system. The pilot will focus on three key areas: (1) Perform a monitoring gaps assessment; (2) Inventory and evaluate existing drought indicators and triggers; and (3) Develop a basin-focused drought monitor as part of the drought portal (www.drought.gov).

2. **Western Water Assessment** (NOAA and University of Colorado): The Western Water Assessment (WWA) was created in 1999 and is a joint effort between the Cooperative Institute for Research in Environmental Sciences at the University of Colorado and NOAA's Earth System Research Laboratory. Both entities are located in Boulder, Colorado.

   WWA is one of seven similar programs funded by the Climate Program Office at NOAA. These programs, called Regional Integrated Sciences and Assessments (RISA), are designed to provide NOAA with information about how to construct its emerging "National Climate Service," the climate analog to the existing National Weather Service. For more information, see http://wwa.colorado.edu/.

3. **Upper Colorado Endangered Fish Recovery Program** U.S. Fish and Wildlife Service (FWS): Established in 1988, the Recovery Program is a unique partnership of local, state and federal agencies, water and power interests, and environmental groups working to recover endangered fish in the Upper Colorado River Basin while water development proceeds in accordance with federal and state laws and interstate compacts. This program has conducted a number of studies related to instream flows and species protection. For more information, see: http://coloradoriverrecovery.org/index.html.

4. **Subcommittee on Groundwater** (ACWI/USGS): The overall goal of the Subcommittee on Groundwater (SOGW) is to develop and encourage implementation of a nationwide, long term ground-water quantity and quality monitoring framework that would provide information necessary for the planning, management, and development of ground-water supplies to meet current and future water needs, and ecosystem requirements. For more information, see: http://acwi.gov/sogw/index.html.

5. **2010 RPA (Resources Planning Act) National Water Assessment** U.S. Forest Service (USFS). The 2010 RPA Water Assessment, to be released in early 2011, will assess the vulnerability of the United States water supply to shortage over the 21st century. Vulnerabilities will be assessed for each of the 98 basins covering the contiguous 48 states, both assuming a continuation of recent climate conditions and assuming

alternative possible future climates posited by the Intergovernmental Panel on Climate Change (IPCC). Vulnerabilities will be characterized as the probability of shortage in light of reservoir storage and inter-basin transfers, with shortage defined as the inability to satisfy projected consumptive use requests while also meeting minimum streamflow requirements. Information on the Water Assessment is posted at: http://www.fs.fed.us/rm/value/research_2010rpa.html. Information on the RPA effort in general is found at: http://www.fs.fed.us/research/rpa/.

6. **Energy and Water in the Western and Texas Interconnects** U.S. Departmernt of Energy (DOE). The DOE Office of Electricity Delivery and Energy Reliability is coordinating an energy water initiative in support of interconnection-wide transmission planning. This work focuses on the western interconnection and Electric Reliability Council of Texas (ERCOT).

DOE's Sandia National Laboratory, in partnership with the Argonne National Laboratory, the Electric Power Research Institute (EPRI), the Idaho National Laboratory (INL), the National Renewable Energy Laboratory (NREL), the Pacific Northwest National Laboratory (PNNL), and the University of Texas is leading this initiative. This work will be conducted in collaboration with the Western Electricity Coordinating Council (WECC), the Western Governors' Association (WGA), WSWC, and ERCOT, and build on the extensive research that currently exists to provide timely information to the interconnection-wide planning process, which is ongoing through 2013.

The various tasks include:

(1) Identify the water consumption associated with different generation technologies and develop a tool to analyze the water consumption associated with different scenarios that emerge from the WECC transmission planning models;
(2) Estimate future demands for water from a range of sectors, including energy, agriculture, municipal, industrial, and environmental, in order to identify potential areas of future water scarcity;
(3) Provide a regional or watershed assessment of available water supply, from both a physical and legal perspective;
(4) Participate in the development and analysis of generation and transmission scenarios as part of the broader Regional Transmission Expansion Planning (RTEP) process; and
(5) Aggregate and interpret Western and Texas Regional Drought Analyses and Contingencies.

For more information see: http://www.sandia.gov/mission/energy/arra/energy-water.html

7. **U.S. Army Corp of Engineers (USACE) Site Specific Water Availability Studies** (USACE). USACE provides support to states and localities on evaluating existing water resources, or developing new water resources to meet growing municipal, industrial, or environmental needs. Below are just three examples of such efforts.

   a. **Lake Sakakawea Surplus Water Study** (USACE). Study by USACE Omaha District to determine the amount of surplus water available for temporary municipal and industrial water supply at Lake Sakakawea from the Missouri River system in North Dakota.

   b. **Seven Oaks Water Conservation Feasibility Study** (USACE). The USACE Los Angeles District is finalizing a feasibility study to authorize seasonal conservation in the Seven Oaks Project on the Santa Ana River in southern California. A subsequent phase of the study may look at establishing a permanent conservation pool.

   c. **Pilot study/research to assess the Marion Reservoir, Kansas sensitivity to theoretical climate change scenarios** (USACE in collaboration with Reclamation). The pilot consists of using the Global Climate Change Model data to input into another model that downscales the global data and develops a series of hydrographs. This hydrograph information is then used in a hydrologic model for the Marion Reservoir.

Water Quality Efforts

In addition to the above water availability studies, there are also other water quality studies that are relevant. These studies focus on assessing water quality at a national or regional scale. Both of the studies below use well-defined methodologies that allow for large-scale evaluations and trend analysis.

1. **National Water Quality Assessment Program (USGS)**: National Water Quality Assessment Program (NAWQA) provides an understanding of water-quality conditions; whether conditions are getting better or worse over time; and how natural features and human activities affect those conditions. Regional and national assessments are possible because of a consistent study design and uniform methods of data collection and analysis. Monitoring data are integrated with geographic information on hydrological characteristics, land use, and other landscape features in models to extend water-quality understanding to unmonitored areas. Relevant western NAWQA study areas include:
    - Lower Mississippi, Arkansas-White-Red, and Texas-Gulf
    - Missouri
    - Rio Grande, Colorado, and Great Basin
    - Pacific Northwest
    - California

    For more information see: http://water.usgs.gov/nawqa/

2. **National Rivers and Streams Assessment (EPA)**: Environmental Protection Agency (EPA) and its state, tribal, federal and other partners are completing work on a survey of the nation's rivers and streams. This survey will use a random sampling design to provide regional and national estimates of the condition of rivers and streams. States and tribes will use consistent sampling and analytical procedures to ensure that results can be compared across the country and over time. This survey is a companion survey to other aquatic resource surveys that EPA is conducting. Prior surveys include a wadeable streams survey, a coastal conditions survey, and a lakes survey. A national wetlands survey is also being planned with field work beginning in 2011. For more information, see: http://water.epa.gov/type/rsl/monitoring/riverssurvey/riverssurvey_index.cfm